

1 **Attitude toward non-human animals and their welfare: do behaviorists differ from**  
2 **other veterinarians?**

3 Angelo Gazzano<sup>1,2</sup>, Sabrina Giussani<sup>3</sup>, Jara Gutiérrez<sup>1</sup>, Asahi Ogi<sup>1,2</sup>, Chiara Mariti<sup>1,2\*</sup>

4

5 <sup>1</sup>Department of Veterinary Sciences, University of Pisa, Pisa, Italy

6 <sup>2</sup> AVEC, Associazione Veterinari Esperti in Comportamento, Pisa, Italy

7 <sup>3</sup> SISCO, Società Italiana Scienze del Comportamento Animale, Cremona, Italy

8 \*Corresponding author: [chiara.mariti@unipi.it](mailto:chiara.mariti@unipi.it), c/o Dip. Scienze Veterinarie –

9 Università di Pisa, viale delle Piagge 2 – 56124 Pisa (Italy)

10

11 **Abstract**

12 Veterinarians are an important source of information about animal care for owners.  
13 They provide general advice about topics important to an animal's well-being, such as  
14 appropriate training, exercise and nutrition. Veterinary behaviorists, when dealing with  
15 undesired or abnormal behaviors, also perform an assessment of pet welfare and an  
16 evaluation of owners' behavior and attitudes. It is likely that these assessments are  
17 affected by the attitude toward animals and toward animal welfare of the behaviorists.  
18 The aim of this study was to investigate whether veterinary behaviorists have a different  
19 attitude toward animals and animal welfare compared to other veterinarians. An online  
20 questionnaire, also including the 20-item Animal Attitude Scale, was completed by a  
21 convenience sample of 540 Italian veterinarians dealing with companion animals: 140  
22 were behaviorists, 22 were starting to work in the field of behavioral medicine, and 378  
23 were not involved in it. Veterinary behaviorists showed a more positive attitude toward  
24 non-human animals and their welfare, which seems to be more related to the interest in  
25 behavioral medicine than to its practice. Moreover, behaviorists attached more  
26 importance to the psychological aspects of pet welfare that they perceived as less  
27 protected in their feline and canine patients. These findings suggest that being involved  
28 in one discipline or another of veterinary medicine do matter in the attitude toward non-  
29 human animals and their welfare.

30 **Keywords:** animal welfare; attitude; behaviorist; behavioral medicine; questionnaire;  
31 veterinarians.

32

### 33 **Introduction**

34 Human attitudes toward animals are becoming of increasing importance in the areas of  
35 conservation and welfare. Indeed, attitude can be defined as a feeling or an opinion  
36 about something or someone, or a way of behaving that is caused by this (Cambridge  
37 Dictionary). This means that, when investigating opinions or feelings about something,  
38 the way that individual is likely to act in a certain situation is also indirectly  
39 investigated.

40 Veterinarians are an important source of information about animal care for owners,  
41 providing general advice about topics that are important to an animal's well-being, such  
42 as appropriate training, exercise and nutrition (Dawson et al., 2016), as well as specific  
43 advice on behavioral issues (Gazzano et al., 2008; 2015). Veterinarians and behaviorists  
44 can help owners by teaching them to look at the whole body language of the animal, and  
45 to properly assess (and possibly intervene in) their welfare (Mariti et al., 2012; 2015).  
46 Indeed, veterinarians have the obligation to ensure their patients' welfare (Yeates,  
47 2012). However, veterinarians have responsibilities to many parties, for instance they  
48 have responsibilities to themselves, animals, clients, colleagues, people they work with,  
49 and the community in which they live. The perception of more responsibility to any of  
50 these may cause differences in attitudes and behaviors (Ozen et al., 2004). Teaching  
51 veterinary ethics can represent a useful tool for the promotion of an appropriate attitude  
52 to animals, clients, and other parties (Thornton et al., 2001).

53 Among the different branches of veterinary medicine, behavioral medicine is a  
54 relatively new one. Its practice focuses on the diagnosis and treatment of pet behavioral  
55 problems. It also implies the assessment of pet welfare and a very broad approach to  
56 problems, including an evaluation of owners' behavior and attitudes, as usually the  
57 owner is the key for the diagnosis and the treatment of behavioral problems. It is likely

58 that these assessments are affected by the attitude toward animals and toward animal  
59 welfare of the behaviorists themselves.

60 The aim of this study was to investigate whether veterinary behaviorists have a different  
61 attitude toward non-human animals and their welfare compared to other veterinarians.

## 62 **Materials and Methods**

### 63 *Protocol*

64 The study consisted in an online survey. Participants were recruited using social  
65 networks and mailing lists available to the authors. The inclusion criteria for  
66 participating were: being a veterinarian working in Italy and working mainly or  
67 exclusively with companion animals (i.e. dogs and cats).

68 The questionnaire (reported in annex 1) was composed of items regarding respondents'  
69 personal data as well as their opinion on the welfare of pet species. In detail,  
70 participants were asked to rate which was, in their opinion, the importance of each of  
71 the Five Freedoms for the welfare of pet species. Participants were also asked the level  
72 of protection they perceived for each of the Five Freedoms in their own feline and  
73 canine patients. In both cases, answers were transformed in a 5-point-Likert scale. The  
74 questionnaire also included the 20-item Animal Attitude Scale. The Animal Attitude  
75 Scale (AAS) is a validated scale originally published by Herzog et al. (1990) to assess  
76 people attitudes toward non-human animals. The original English version has been  
77 back-translated into Italian by two people mastering English, one being an expert in  
78 animal behavior and welfare and one not involved in the field. In order to make the  
79 scale more suitable to our context and aim, the scale was slightly amended with the  
80 author's (Herzog) permission. The word 'cock-fighting' was substituted with 'dog-  
81 fighting'; and respondents were asked about their opinion on the use of frogs, instead of

82 cats, for educational dissection. In the AAS answers were transformed in a 5-point-  
83 Likert scale, and the score of questions assessing a negative attitude toward non-human  
84 animals was inverted. The total score for AAS was calculated by summing the score  
85 obtained for single items.

86 Herzog et al. (2015) suggested that it is possible to categorize the items of the AAS  
87 according to the issue they deal with, and then to group similar items in order to create  
88 thematic subscales. For the current study, the following subscales were created: attitude  
89 toward Dogs, Food, Research, and Human Moral Dominance (see annex 1). For each  
90 subscale, the corresponding score was calculated by summing the score obtained by  
91 respondents for each item belonging to that subscale.

## 92 *Participants*

93 A convenience sample of 540 Italian veterinarians working with companion animals  
94 participated at the study. The whole sample was composed by the following sub-  
95 samples: 1) a group of 140 veterinary behaviorists (VB, recognized as experts in animal  
96 behavior by FNOVI, Italian Federation of Veterinarians Registers); 2) a group of 22  
97 veterinarians who were not experts in animal behavior (VNE, they had attended only  
98 short courses about behavioral medicine or had not finished an institutional course yet),  
99 but they had already started running some consultations; and 3) a group of 378  
100 veterinarians working with other branches of veterinary medicine (VOD, veterinarians  
101 other disciplines). These three groups were as matched as possible for relevant factors,  
102 such as the age, the year of graduation, the gender, and the context where they were  
103 working (Table 1). It was also checked that the participants of all groups were coming  
104 from throughout Italy, including areas from the South, Center and North of the Country.

105 The comparison between VNE, VB and VOD was used to test if the practice of  
106 behavioral medicine or the interest in it was related to a different attitude toward non-  
107 human animals.

108 In order to get a better picture of the attitude toward animals in the world of veterinary  
109 medicine, and to test if behavioral medicine had special features leading to a different  
110 attitude toward non-human animals, veterinarians were further distinguished in smaller  
111 groups according to the field they were more involved in. The group of VOD was  
112 distinguished in one sub-group called internists (VI, veterinarians who visit animals,  
113 interact with them and do overall assessments on the health state of the animals, n=346)  
114 and one sub-group called surgeons and anaesthesists (VSA, veterinarians who have a  
115 more restricted target and more limited interactions with their patients, i.e. those who  
116 mainly work with animals under anesthesia, n=32).

117

### 118 *Statistical analysis*

119 Answers provided by different groups of veterinarians were compared using the  
120 Kruskal-Wallis and then the Mann-Whitney U test ( $P < 0.05$ ; multiple comparison  
121 corrections were performed using the Benjamini-Hochberg procedure) run with the  
122 software SPSS Statistic 17.0 (Chicago, IL).

123

### 124 **Results**

125 Data and results of the statistical analysis comparing AAS total score and subscales  
126 scores are reported in table 2.

127 Looking at the total score of the Animal Attitude Scale, VB obtained a significantly  
128 higher total score compared to VOD, meaning that they had a more positive attitude  
129 toward non-human animals and their welfare (Figure 1). The AAS total score was

130 statistically higher for VB compared to VI, and it was higher for VI compared to VSA.  
131 In addition, non-experts practicing behavioral medicine (VNE) showed a higher AAS  
132 total score compared to VOD, as well as compared to VB.  
133 The statistical analysis also revealed that VB obtained statistically higher scores than  
134 VOD for most of the sub-scales, i.e. for the sub-scales on Research, Food, and Human  
135 Moral Dominance. However, no difference was found for the sub-scale on Dogs (Figure  
136 2).  
137 The same trend was observed for deeper analyses. VB obtained higher scores than VI  
138 and VSA for the sub-scales on Research, Food and Human Moral Dominance, but not  
139 for the Dog sub-scale. In addition, VI obtained higher scores than VSA the sub-scales  
140 on Research, Food and Human Moral Dominance, but not for the Dog sub-scale.  
141 VNE showed a more positive attitude for all the sub-scales, including that dealing with  
142 dogs, when compared to both VOD and VB. Only subscale on Food was not statistically  
143 different for VNE and VB, although the difference was remarkable ( $p=0.059$ ).  
144 Statistical analysis revealed that VB and VOD did not differ in the importance they  
145 attached to the physical aspects of animal welfare: hunger and thirst (medians: 5.00  
146 versus 5.00; min-max range: 2-5 versus 1-5;  $U = 26052.0$ ,  $P = 0.137$ ); pain, injury and  
147 disease (medians: 5.00 versus 5.00; min-max range: 2-5 versus 1-5;  $U = 25972.0$ ,  $P =$   
148  $0.106$ ). However, VB compared to VOD attached more importance to the freedoms  
149 related to psychological aspects: the freedom to express normal behavior (medians: 5.00  
150 versus 5.00; min-max range: 3-5 versus 1-5;  $U = 20816.0$ ,  $P < 0.01$ ) and the freedom  
151 from fear and distress (medians: 5.00 versus 5.00; min-max range: 3-5 versus 1-5;  $U =$   
152  $22275.5$ ,  $P < 0.01$ ). Behaviorists also attached more importance to the freedom from  
153 discomfort, which leads on to both physical and psychological aspects (medians: 5.00  
154 versus 5.00; min-max range: 2-5 versus 1-5;  $U = 23336.0$ ;  $P = 0.01$ ).

155 VB considered the freedom to express normal behavior (medians: 2.00 versus 2.00;  
156 min-max range: 1-5 versus 1-5;  $U = 22872.5$ ;  $P < 0.01$ ) and the freedom from fear and  
157 distress (medians: 2.00 versus 3.00; min-max range: 1-5 versus 1-5;  $U = 21678.0$ ;  $P <$   
158  $0.01$ ) as less guaranteed to companion animals. However, the trend was inverted for the  
159 freedom from hunger and thirst (medians: 4.00 versus 3.00; min-max range: 2-5 versus  
160 2-5;  $U = 23790.5$ ;  $P = 0.005$ ), and the freedom from pain, injury and disease (medians:  
161 4.00 versus 3.00; min-max range: 2-5 versus 2-5;  $U = 23447.5$ ;  $P = 0.002$ ), that were  
162 considered less guaranteed to their patients by VOD. No difference was observed for the  
163 freedom from discomfort (medians: 3.00 versus 3.00; min-max range: 2-5 versus 1-5;  $U$   
164  $= 26625.00$ ;  $P = 0.383$ ).

165

## 166 **Discussion**

167 Research has widely investigated the factors that can affect human attitude toward  
168 animals. For example, the gender has been repeatedly found to impact on the empathy  
169 toward animals, with women being more empathetic to non-human animals and  
170 obtaining higher scores in the Animal Attitude Scale (Herzog et al., 1990; Mazas et al.,  
171 2013; Herzog, 2015). In the field of veterinary medicine, both students (Serpell, 2005)  
172 and professionals (Ostović et al., 2016; Colombo et al., 2017) were found to be  
173 influenced in their attitude toward non-human animals by factors such as the gender and  
174 previous experiences with animals. However, until now veterinarians have been  
175 investigated as a whole professional category, and scant attention has been reserved to  
176 the category of veterinarians who are mostly involved in the assessment of pet  
177 behaviour and welfare.

178 In the current study, veterinary behaviorists have shown a more positive attitude toward  
179 non-human animals and animal welfare compared to veterinarians with different kinds

180 of specialization, regardless of the fact that the other veterinarians were grouped  
181 together or assessed as smaller groups (only internists or only surgeons and  
182 anaesthetists). It was also found that internists obtained higher AAS scores compared to  
183 surgeons and anaesthetists, suggesting that a higher interaction with animal patients or a  
184 higher attention paid to overall assessments of non-human animals may be related to a  
185 more positive attitude toward them and their welfare. However, veterinary behaviorists  
186 were found to have a more positive attitude than internists. This may be the  
187 consequence of practicing behavioral medicine or it may be the cause of turning a  
188 veterinarian into a behaviorist. The latter seems to be more likely, considering that the  
189 current study also found that non-experts practicing behavioral medicine had a more  
190 positive attitude, including a better attitude toward dogs, when compared to other  
191 veterinarians and to behaviorists. These findings should be interpreted cautiously, due to  
192 the limited number of participants (especially in the group of non-experts in animal  
193 behavior) and to the large number of factors that may affect attitude toward non-human  
194 animals. However, such data suggest that people interested in behavioral medicine have  
195 an overall positive attitude toward animals which is not developed through the practice  
196 of behavioral medicine. Indeed, it seems that this attitude tends to become more  
197 negative when veterinarians have practiced it for a certain time, as shown by the  
198 difference between experts and non-experts in behavioral medicine. Therefore an a  
199 priori factor, i.e. the interest in the field of animal behavior, is more likely to be  
200 responsible for the better attitude toward non-human animals.

201 The lack of differences between behaviorists and other vets regarding dogs may be due  
202 to the fact that dogs represented the most frequent visited species for both categories,  
203 who are well-disposed and familiar to dogs.

204 Another topic covered by this survey is that of the Five Freedoms for animals (Council  
205 F. A. W., 2009). Although this list was originally prepared for the protection of welfare  
206 in farm animals, and its application is partially outdated, for the current study it was  
207 chosen to investigate on them for two main reasons: the Five Freedoms are the basis for  
208 the evaluation of animal welfare, susceptible to be applied also to companion animals;  
209 and most veterinarians are familiar with them.

210 Taken together, the findings of this study on the opinion about pet welfare suggest that  
211 behaviorists and other veterinarians have a very different perception and possibly a way  
212 of assessing the welfare of their own patients. Veterinary behaviorists considered the  
213 freedom to express normal behavior, as well as the freedom from fear and distress, more  
214 important (highly statistically significant) for pet species and less protected for the  
215 welfare of their own patients. In other words, behaviorists attached more importance to  
216 the psychological aspects of pet welfare compared to other veterinarians. Veterinary  
217 behaviorists also considered the freedom from discomfort, which leads on to both  
218 physical and psychological aspects, more important but equally protected compared to  
219 other vets' opinion. On the contrary, veterinarians working in disciplines other than  
220 behavioral medicine considered the freedoms related to physical aspects (freedom from  
221 hunger and thirst, and freedom from pain, injury and disease) as less guaranteed to their  
222 patients. It would be interesting to investigate whether behaviorists and other vets differ  
223 also on specific issues related to dog welfare and health, such as disorders of pedigree  
224 dogs that have been found to concern veterinarians (Farrow et al., 2014).

225 The above mentioned differences are unlikely due to the different patients the two  
226 groups of veterinarians deal with, as probably there is a huge overlap in the population  
227 of patients visited by the two groups of veterinarians. In fact, pets brought to a  
228 behavioral consultation are also led to the general veterinarian, who have the

229 opportunity to visit the same dogs or cats with low welfare and low levels of protection.  
230 In addition, almost all the veterinary behaviorists of the sample were also practicing  
231 other branches of veterinary medicine, so their patients were not limited to those with  
232 behavioral problems. A possible explanation for the different perception of pets welfare,  
233 and in particular the higher attention paid by behaviorists to the psychological aspects of  
234 welfare, is the higher interest for animal behavior or the higher knowledge about it they  
235 have compared to their colleagues. It is likely that behaviorists are more able to  
236 recognize signs of stress compared to other veterinarians, who may miss subtle signs  
237 due to the lack of teaching in veterinary schools (Mariti et al., 2012; 2015). However,  
238 another possible explanation, that does not exclude the previous ones, is that the more  
239 positive attitude toward animals found with the AAS is responsible for a higher  
240 empathy and therefore a higher concern about pets' welfare.

241 Although the correlation between attitude and behavior can be affected by many factors,  
242 such as affective and cognitive ones (Millar and Tesser, 1990), the different perception  
243 here observed may lead non-behaviorist vets to be less focused on improving the  
244 psychological aspects of their patients' welfare, and probably on advising clients on the  
245 provisions they can apply. This has a strong impact on the welfare of dogs and cats,  
246 who have more chances to visit a general veterinarian rather than a behaviorist. It would  
247 be relevant for pet welfare that general veterinarians had a positive attitude toward  
248 animal welfare and that they were well versed in the assessment of pet welfare. Recent  
249 studies have indeed demonstrated that dogs (Mariti et al., 2016) and cats (Mariti et al.,  
250 2017) are really stressed in all phases related to visiting a veterinary clinic and that  
251 veterinarians sometimes do not behave appropriately to reduce the level of stress of  
252 their canine and feline patients. Veterinarians need to ensure that clients are able to  
253 discuss behavior issues and are provided with appropriate support (Roshier & McBride,

254 2013). The clinic may offer a behavioral service to clients, which is important for pet  
255 welfare and also for the guardian's satisfaction (Herron & Lord, 2012).

256 The relatively high number of respondents and the presence of a wide range of  
257 specializations, origin or age, makes the sample likely to be representative of the larger  
258 population of Italian companion animals' veterinarians. Nevertheless, a potential  
259 limitation of the study must be stressed. Volunteer bias is often a limitation in survey-  
260 based research. Using an online survey with a title including the words "animal  
261 behavior and welfare" may have selected those veterinarians who were more interested  
262 in these topics. However, the inclusion of non-behaviorist vets with a lower interest in  
263 animal behavior and welfare would have probably led to even greater differences.

264 The findings of the current study suggest that being involved in one discipline or  
265 another of veterinary medicine do matter, but probably there is an *a priori* difference,  
266 i.e. the interest in behavioral medicine is linked to having a more positive attitude  
267 toward non-human animals. The practice itself may actually reduce this positive attitude  
268 over time, that is unlikely due to length of service (Colombo et al., 2017). Reasons for  
269 this change in attitude can be numerous. The practice of behavioral medicine can be  
270 very stressful, and it can favor professional burnout (da Graça Pereira et al., 2015;  
271 Caverni et al., 2016). The inability to cope with behavioral cases or their failure might  
272 be responsible for a sort of detachment, of aloofness from non-human animals.  
273 Although degrees of detachment and equanimity are essential if the clinician is not to be  
274 overwhelmed by the feeling state of the patient, their exaggeration can be detrimental  
275 and needs to be addressed (Post et al., 2014).

276

277 **Conclusions**

278 Veterinary behaviorists showed more concern for animal welfare issues than did other  
279 veterinarians both in terms of importance given to the *Five Freedoms* for the welfare of  
280 pet animals and in human sensitivity to animal use. This may be linked to the more  
281 positive attitude toward non-human animals and their welfare shown by behaviorists.

282

### 283 **Acknowledgments**

284 Authors want to thank all the veterinarians who participated at the survey. A special  
285 thank to Laura Lembi for helping with the back-translation of the Animal Attitude  
286 Scale.

287 Author contributions: A.G., S.G. and C.M. participated in the study design. S.G., A.O.  
288 and C.M. were responsible for data collection. A.G. and C.M. performed the statistical  
289 analysis. C.M., J.G. and A.O. interpreted the data and drafted the manuscript. All  
290 authors revised the manuscript and have read and approved the final manuscript.

291

### 292 **Ethical considerations**

293 Under the requirements of the host institution this study did not require ethical approval.  
294 However, the online form to be filled in included an introduction with the general topic  
295 covered by the study and the consent of respondent for using data for research purposes  
296 under the Italian law on privacy.

297

### 298 **Conflict of interest**

299 The authors declare no conflict of interest.

300

### 301 **References**

302 Cambridge Dictionary <http://dictionary.cambridge.org/dictionary/english/attitude>

303 Caverni, B., Gazzano, A., Fossati, L., Mariti, C., 2016. The risk of burnout in veterinary  
304 behaviorists: effectiveness of a preventative course. Proceedings of the European  
305 Congress Animal Welfare & Behavior Medicine pp 56-57. Cascais, Portugal.

306 Colombo, E.S., Crippa, F., Calderari, T., Prato-Previde, E., 2017. Empathy toward  
307 animals and people: The role of gender and length of service in a sample of Italian  
308 veterinarians. *J. Vet. Behav.* 17, 32-37.

309 Council F.A.W., 2009. Farm animal welfare in Great Britain: Past, present and future.  
310 Farm Animal Welfare Council.

311 da Graça Pereira, G., Oliveira, J., Ramalho, S., Morais, D., 2015. Mental health,  
312 professional burnout and life satisfaction: are there differences between behavioral  
313 medicine specialists and other specialities in Portugal? Proceedings of the AWSELVA-  
314 ECAWBM-ESVCE Congress, p 63. AWSELVA-ECAWBM-ESVCE: Bristol, UK.

315 Dawson, L.C., Dewey, C.E., Stone, E.A., Guerin, M.T., Niel, L., 2016. A survey of  
316 animal welfare experts and practicing veterinarians to identify and explore key factors  
317 thought to influence canine and feline welfare in relation to veterinary care. *Anim.*  
318 *Welf.* 25, 125-134.

319 Farrow, T., Keown, A.J., Farnworth, M.J., 2014. An exploration of attitudes towards  
320 pedigree dogs and their disorders as expressed by a sample of companion animal  
321 veterinarians in New Zealand. *N. Z. Vet. J.* 62, 267-273.

322 Gazzano, A., Mariti, C., Alvares, S., Cozzi, A., Tognetti, R., Sighieri, C., 2008. The  
323 prevention of undesirable behaviors in dogs: effectiveness of Veterinary Behaviorist's  
324 advice given to puppies' owners. *J. Vet. Behav.: Clin. Appl. Res.* 3, 125-133.

325 Gazzano, A., Bianchi, L., Campa, S., Mariti, C., 2015. The prevention of undesirable  
326 behaviors in cats: Effectiveness of veterinary behaviorists' advice given to kitten  
327 owners. *J. Vet. Behav.: Clin. Appl. Res.* 10, 535-542.

328 Herron, M.E., Lord, L.K., 2012. Use of and satisfaction of pet owners with a clinical  
329 behavior service in a companion animal specialty referral practice. *J. Am. Vet. Med.*  
330 *Assoc.* 241, 1463-1466.

331 Herzog, Jr. H.A., Betchart, N.S., Pittman, R.B., 1990. Gender, sex role orientation, and  
332 attitudes toward animals. *Anthrozoös* 4, 184-191.

333 Herzog, H., Grayson, S., McCord, D., 2015. Brief measures of the animal attitude scale.  
334 *Anthrozoös* 28, 145-152.

335 Mariti, C., Gazzano, A., Moore, J.L., Baragli, P., Chelli, L., Sighieri, C., 2012.  
336 Perception of dogs' stress by their owners. *J. Vet. Behav.: Clin. Appl. Res.* 7, 213-219.

337 Mariti, C., Raspanti, E., Zilocchi, M., Carlone, B., Gazzano, A., 2015. The assessment  
338 of dog welfare in the waiting room of a veterinary clinic. *Anim. Welf.* 24, 299-305.

339 Mariti, C., Bowen, J.E., Campa, S., Grebe, G., Sighieri, C., Gazzano, A., 2016.  
340 Guardians' Perceptions of Cats' Welfare and Behavior Regarding Visiting Veterinary  
341 Clinics. *J. Appl. Anim. Welf. Sci.* 19, 375-384.

342 Mariti, C., Pierantoni, L., Sighieri, C., Gazzano, A., 2017. Guardians' Perceptions of  
343 Dogs' Welfare and Behaviors Related to Visiting the Veterinary Clinic. *J. Appl. Anim.*  
344 *Welf. Sci.* 20, 24-33.

345 Mazas, B., Fernández Manzanal, M.R., Zarza, F.J., María, G.A., 2013. Development  
346 and validation of a scale to assess students' attitude towards animal welfare. *Int. J. Sci.*  
347 *Educ.* 35, 1775-1799.

348 Millar, M.G., Tesser, A., 1990. Attitudes and Behavior: the Cognitive-Affective  
349 Mismatch Hypothesis. *Proceedings of Advances in Consumer Research*, Goldberg,  
350 M.E., Gorn, G., Pollay R.W. (Eds), Vol. 17, pp. 86-90. Association for Consumer  
351 Research, Provo: UT.

352 Ozen, A., Ozturk, R., Yasar, A., Armutak, A., Basagac, T., Ozgur, A., Seker, I.,  
353 Yerlikaya, H., 2004. An attitude of veterinary practitioners towards animal rights in  
354 Turkey. *Vet. Med. (Praha)* 49, 298-304.

355 Ostović, M., Mesić, Ž., Mikuš, T., Matković, K., Pavičić, Ž., 2016. Attitudes of  
356 veterinary students in Croatia toward farm animal welfare. *Anim. Welf.* 25, 21-28.

357 Post, S.G., Ng, L.E., Fischel, J.E., Bennett, M., Bily, L., Chandran, L., Joyce, J.,  
358 Locicero, B., McGovern, K., McKeefrey, R.L., Rodriguez, J.V., Roess, M.W., 2014.  
359 Routine, empathic and compassionate patient care: definitions, development, obstacles,  
360 education and beneficiaries. *J. Eval. Clin. Pract.* 20(6), 872-80.

361 Roshier, A.L., McBride, E.A., 2013. Canine behavior problems: Discussions between  
362 veterinarians and dog owners during annual booster consultations. *Vet. Rec.* 172, 235.

363 Serpell, J.A., 2005. Factors influencing veterinary students' career choices and attitudes  
364 to animals. *J. Vet. Med. Educ.* 32, 491-496.

365 Thornton, P.D., Morton, D.B., Main, D.C., Kirkwood, J.K., Wright, B., 2001.  
366 Veterinary ethics: filling a gap in undergraduate education. *Vet. Rec.* 148, 214-216.

367 Yeates, J.W., 2012. Maximising canine welfare in veterinary practice and research: A  
368 review. *Vet. J.* 192, 272-278.

369

370 **Figure 1:** Total scores for the Animal Attitude Score obtained by all investigated categories of  
371 veterinarians: veterinary behaviourists (VB), veterinarians involved in other disciplines (VOD),  
372 veterinary internists (VI), veterinarians involved in surgery and anesthesia (VSA), and  
373 veterinarians interested in behavioral medicine but not recognized experts in animal behavior  
374 (VNE).

375

376

377 **Figure 2:** Scores obtained for the four AAS sub-scales (attitude towards *Dogs, Food, Research*  
378 and *Human Moral Dominance*) by all the investigated categories of veterinarians: veterinary  
379 behaviorists (VB), veterinarians involved in other disciplines (VOD), veterinary internists (VI),  
380 veterinarians involved in surgery and anesthesia (VSA), and veterinarians interested in  
381 behavioral medicine but not recognized experts in animal behavior (VNE).

382

383